Thyroglobulin levels are useful indicators in patients rendered athyrotic because detectable levels of thyroglobulin can be identified in persons without thyroid disease and elevated levels can be seen in patients with autoimmune disease of the thyroid. However, the level of thyroglobulin is of no value in the separation of benign from malignant thyroid nodules.

MARTIN A. SCHWARTZ, MD
W. H. BLAHD, MD

REFERENCES

Van Herle AJ, Vassart G, Dumont JE: Control of thyroglobulin synthesis and secretion. N Engl J Med 301:239-249, 307-314, Aug 2, 1979, Aug 9, 1979

Schlossberg AH, Jacobson JC, Ibbertson HK: Serum thyroglobulin in the diagnosis and management of thyroid carcinoma. Clin Endocrin 10:17-27, Jan 1979

Regional Cerebral Blood Flow

IN CONTRAST to the qualitative estimate of cerebral blood flow obtained with a routine brain scan, a more precise estimation of regional cerebral blood flow can be obtained using freely diffusible xenon 133 gas. The washout of the radioactive gas from the head is monitored using either one or several radiation detection probes to calculate cerebral blood flow. Xenon 133 may be injected into the internal carotid artery by way of catheter or peripherally into a vein, or it may be inhaled and passed into the bloodstream by way of the pulmonary capillaries. Although the amount of blood flow in grey matter is of greatest importance, the probes can measure radioactivity in white matter and, with intravenously given or inhaled xenon 133, in extracerebral tissues as well. To differentiate between these compartments, washout is monitored for at least ten minutes. The first portion of the biphasic washout curve is assumed to be produced by activity in the grey matter, with the second portion primarily produced by activity in the white matter and extracerebral tissue. Equations derived from the Fick principle are applied to the curve to calculate regional blood flow in both white and grey matter. Sources of error include scattered radiation from outside the probe field of view, an unknown contribution to the count rate from extracerebral tissues and the pronounced effect of the partition coefficient (or differential solubility in tissue) of ^{133}Xe, which may vary greatly in areas of abnormal tissue.

In spite of the sources of error, the procedure provides sufficient information to be useful in the diagnosis and follow-up after surgical treatment of cerebrovascular disease. It is also useful in conditions of low blood flow such as dementia and after severe head injuries as well as to show the response to ventricular shunting in normal pressure hydrocephalus.

Because of the value of quantitating cerebral blood flow, better methods of estimation are being sought. One involves use of krypton 81m, a gas with a 13-second half-life, to show arterial flow. Others use an emission computed tomographic scanner, with a positron-emitting radionuclide to demonstrate distribution of blood flow in the brain. As yet, these methods are confined to a few research centers.

NORAH MILNE, MD
KENNETH P. LYONS, MD

REFERENCES

Holman BL: Concepts and clinical utility of the measurement of cerebral blood flow. Semin Nucl Med 6:233-251, Jul 1976

Obrist WD, Thompson HK Jr, Wang HS, et al: Regional cerebral blood flow estimated by 133-xenon inhalation. Stroke 6:245-256, May-Jun 1975

Phelps ME: Emission computed tomography. Semin Nucl Med 7:337-365, Oct 1977

Melamed E, Lavy S, Bentin S, et al: Reduction in regional cerebral blood flow during normal aging in man. Stroke 11:31-35, Jan-Feb 1980

Adrenal Scintigraphy

IN 1970 iodocholesterol labeled with iodine 131 was introduced for scanning the adrenal glands. Since 1975 iodomethylnorcholesterol ^{131}I has been the agent of choice because of its higher organ-to-background ratio. Adrenal scintigraphy can be used to demonstrate adrenal structure and function in a manner similar to radioactive iodine scintigraphy being used for the thyroid gland. In more than 95 percent of cases of Cushing syndrome, the adrenal scan can differentiate between hyperplasia, carcinoma or adenoma. An autonomously functioning, unilateral, adrenal adenoma can be detected before the disease is evident clinically, even when plasma cortisol levels are still normal.

Adrenal scintigraphy is the most sensitive method for localizing hyperfunctioning adrenal remnants following bilateral adrenalectomy. Adrenal suppression with dexamethasone can be used to demonstrate aldosterone- or androgen-producing adenomas which appear as a unilateral increase in uptake. The specificity of suppression scans for lateralizing aldosterone-secreting tumors is 94 percent. The advantage of this method is the elimination of adrenal arteriography and venography particularly when the scan demonstrates unilateral pathology. These radioactive cholesterol agents do not concentrate in medullary tissue; therefore, the procedure is less sensitive